Appendix A: Requirements for Cathodic Protection Monitoring

1. **For Galvanic Cathodic Protection Systems:**

   A. All measurements must be made by placing a saturated copper/copper sulfate reference electrode in direct contact with the soil electrolyte.

   B. The copper/copper sulfate electrode must be placed over the center line of each tank and within 1 foot of each piping run. For single-walled tanks a minimum of three (3) measurements are to be made over the center line of each tank, one at each end and one at the tank's midpoint. For double-walled tanks, a minimum of one voltage measurement over each tank's midpoint is required.

   C. All measurements must be recorded using a direct current voltage measuring device with a minimum of 10 megohms input impedance, accurate to at least + 1% at 1 volt.

   D. A measurement of at least negative 0.85 volts must be recorded for each test location and each metallic facility component, including tanks, piping, and connectors that are cathodically protected.

   E. The tank owner shall maintain, repair or replace the system in accordance with the recommendations of the National Association of Corrosion Engineers, Recommended Practices 0285-2002 whenever the system does not register a negative voltage reading of at least 0.85 volts for each tank or piping run, except as provided for in paragraph G, below.

   F. The frequency of cathodic protection monitoring must be consistent with the requirements outlined in section 5(D)(4) and (5).

   G. When a negative voltage of at least 0.85 volts is not achieved upon installation, the measurement must be repeated within 6 months. Upon failing to achieve a negative voltage of at least 0.85 volts after the 6-month period, the tank owner shall comply with paragraph E, above.

2. **For Impressed Current or Galvanic Cathodic Protection Systems**

   Test methods and criteria as described in the National Association of Corrosion Engineers TM 0101-2001, Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Tank Systems, or TM 0497-2002, Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems, are to be used to monitor impressed current systems. These methods for testing galvanic systems may be used with prior written approval of the commissioner.

NOTE: Structure to soil potentials measured when the soil is frozen may be inaccurate because of the increased resistance of the soil electrolyte. Cathodic protection monitoring schedules should be planned to avoid frozen soil conditions.

Appendix B: Requirements for Tank and Piping Line Tightness Tests

1. Volumetric tank tightness test requirements:

A. For all tanks without overfill and spill prevention equipment installed in accordance with section 5(B)(3) or 6(B)(3) and properly operating, all tests must be conducted by overfilling the tank at least to grade level. For tanks with operating overfill and spill prevention equipment meeting the requirements of this rule, tests may be conducted if the tank is at least 60 percent full, provided the test is in accordance with manufacturer protocols and with any limitations determined by independent testing in accordance with U.S. Environmental Protection Agency approved protocols, or other protocols approved by a nationally recognized independent testing organization, including but not limited to the ASTM and the National Work Group on Leak Detection Evaluations.

B. All tests must take into consideration all variables which, may affect the determination of a leak rate, including, but not limited to, temperature, pressure, external water table elevation, vapor pockets and tank end deformation.

C. External water table elevation must be verified via a tank area monitoring well at time of testing for each tank location.

D. All tests must be performed in strict conformity to all of the testing equipment manufacturer's operating procedures, and the following standard protocols:

(1) Tests must not be conducted during a fluctuating ground water table;

(2) Height-to-volume conversion factors must be measured rather than calculated;

(3) The test must be conducted under nearly constant hydrostatic pressure; and

(4) If the tank is less than 95% full during the volumetric test then the ullage space must also be tested using an appropriate tank tightness test method.

2. Other tank tightness tests requirements:

A. All other tank tightness tests must be performed in strict conformity to the manufacturer's protocols as used in the method's independent performance testing.

B. The groundwater elevation must be measured at the time of testing via an observation well.

3. Piping line tightness test requirements:

A. All pressurized product piping tests must be performed at 150% operating pressure, or if performed at a lower pressure, it must be able to obtain a leak rate equivalent or smaller than that determined by the piping test method's independent performance testing in accordance with U.S. Environmental Protection Agency approved protocols.

B. All tests must be performed in strict conformity to all of the testing equipment manufacturer's standard operating procedures. In addition, the test must be run a minimum of one hour.

4. Other requirements:

A. All testing technicians shall be certified by the manufacturer of the testing equipment.

B. Tank and piping tightness tests involving the removal and reinstallation of existing facility components, including but not limited to, leak detection or overfill prevention equipment, drop tubes, or vent valves, must have an underground oil storage tank installer or inspector present to supervise such facility equipment removals and repairs. The installer or inspector must be certified by the Maine Board of Underground Oil Storage Tank Installers and by the manufacturer of the equipment being repaired, when such manufacturer cerification is available. Tank testing involving excavation above, around or in close proximity to tanks or piping also requires a Maine certified tank installer to be present to supervise such excavation in accordance with section 5(D)(21) of this rule.

C~~B~~. All test results must include the following information in order to be accepted by the commissioner:

(1) Facility name, address, registration and tank number, and the product stored;

(2) Whether the facility components tested passed or failed, and the measured leak rate;

(3) The method's threshold for declaring a leak; and

(4) Certification that the test method has been performed according to the manufacturer's protocols used in the third party evaluation.

D~~C~~. Written test results must be submitted to the commissioner by the facility owner and the tester when conducted to verify evidence of a possible leak.

Routine annual precision tests conducted to meet the requirements of section 5(C)(2)(a) of this rule need only to be submitted by the facility owner.

Appendix C: Requirements for Pneumatic (Air) and Other Pre-installation Tightness Testing

For Piping and Tanks:

1. Air pressure testing of tanks and piping shall only be performed on new, empty tanks and piping, which have never contained product, and the manufacturer has not specified an alternate means of tightness testing.

2. When conducting an air pressure test on metallic tanks or piping, all external joints, seams and connections shall be soaped.

3. The test shall be maintained for a minimum of 1 hour, and all soaped areas shall be visually inspected for bubbles or any other indication of a leak.

4. Any loss of pressure or appearance of bubbles shall constitute failure of the test.

Piping:

5. Underground piping shall be physically isolated from the tank prior to the test.

6. Underground primary piping shall be air tested to 150% of the maximum anticipated pressure of the system, but not less than fifty (50) pounds per square inch (psi) gauge at the highest point of the system.

7. Underground secondary piping must be tightness tested before being backfilled in accordance with manufacturers' instructions.

Tanks:

8. Tanks shall be tested before being covered, enclosed or placed in service.

9. Primary tanks must be air tested at not less than three (3) pounds per square inch (psi) and not more than five (5) pounds per square inch (psi) gauge. Gauges used during air testing of tanks must have a maximum limit of 10-15 pounds per square inch (psi).

10. The interstial space of double-walled tanks must be tightness tested following the manufacturer's instructions.

Appendix D: Installation Requirements Applicable to New and Replacement Tanks

1. All new and replacement tanks and associated leak detection and overfill and spill prevention equipment must be installed in accordance with manufacturer's instructions and the following nationally accepted codes of practice: American Petroleum Institute Publication 1615, "Installation of Underground Petroleum Storage Systems"; Petroleum Equipment Institute (PEI) Publication RP 100-2000, "Recommended Practices for Installation of Underground Liquid Storage Systems"; and National Fire Protection Association Code 30, 30A or 31.

NOTE: Tank installation instructions may require specific sized pea stone or gravel. Instructions also may specify mechanical compaction or layered placement of bedding and backfill. Always consult the installation instructions provided by the manufacturer, prior to installation.

2. Cathodically protected steel tanks must be set on a firm base and surrounded on all sides with at least 12 inches of noncorrosive inert material, such as clean sand, pea stone, or gravel, well tamped in place. The tanks must be placed in the hole with care, making sure not to scrape the protective coating off coated tanks, or damage attached cathodic protection components. Cathodic protection systems require electrical wiring connected to the tank at each end and at its centerline, and accessible for voltage readings at the ground surface as well as three (3) locations along the centerline of the tank to place a reference electrode in contact with the soil.

3. Cathodically protected steel underground tanks must be covered with a minimum of 2 feet of sand, pea stone or gravel, or with not less than 1 foot of sand on top of which is placed a slab of reinforced concrete not less than 4 inches thick. This fill must be free of debris, boulders, large rocks or other materials that may cause abrasions to the protective coating of the tank. When tanks are, or are likely to be, subjected to traffic, they must be protected from damage from vehicles passing over them by at least 3 feet of backfill or, 18 inches of well-tamped backfill plus 6 inches of reinforced concrete or 8 inches of asphalt paving. When asphalt or reinforced concrete paving is used as part of the protection, it must extend at least 1 foot horizontally beyond the perimeter of the tank in all directions.

4. All cathodically protected steel and nonmetallic fiberglass tanks must be installed in accordance with manufacturer instructions. The minimum depth of cover is as specified in section 3 above.

5. New underground tanks must be tested for tightness before being covered or placed in use by a test method approved by the manufacturer. If a pneumatic test is conducted, it should be done in conformance with the requirements of Appendix C.

NOTE: Air pressure testing when petroleum vapors are present in the tank may result in explosion, and shall not be conducted after petroleum product has been placed in the tank.

6. All temporary supports must be removed prior to final backfilling.

7. All electrical wiring must be performed in accordance with the current State of Maine electrical code.

8. Anchoring is required when a tank is installed in an area where groundwater will be in contact with the tank or in a 100 year flood plain as mapped by the Federal Emergency Management Agency (FEMA), or if such mapping is unavailable, as determined by the flood of record or by the presence of flood plain soils. When anchoring tanks equipped with cathodic protection, the holddowns must be electrically isolated from the tank. Anchoring of all tanks must be performed in accordance with the tank manufacturer's specification or PEI Publication RP 100-2000.

NOTE: FEMA flood plain maps are available for inspection at most municipal offices.

Appendix E: Installation Requirements for New and Replacement Piping

1. All new and replacement piping, sumps and associated leak detection must be installed in accordance with the manufacturer's instructions and the following nationally accepted codes of practice: American Petroleum Institute Publication 1615, "Installation of Underground Petroleum Storage Systems", Petroleum Equipment Institute (PEI) Publication RP 100-2000, "Recommended Practices for Installation of Underground Liquid Storage Systems", STI Standard R 892, and NFPA 30, 30A and 31.

2. Before underground piping is installed, the trench must receive as a minimum a 6-inch deep bed of well compacted noncorrosive material such as clean sand, pea stone or gravel. All trenches must be wide enough to permit at least 6 inches of noncorrosive backfill material around all lines.

3. Prior to being covered or placed in service, all new and replacement piping must be tested for tightness by a method approved by the manufacturer. Air pressure tests are to be conducted in accordance with the requirements of Appendix C, and hydrostatic tests must be conducted in accordance with the requirements of Appendix B.

4. All temporary supports must be removed prior to final backfilling.

5. All vent piping for storage of Class I liquids must extend at least 12 feet above the ground surface and be positioned such that vapors will not pose a hazardous condition.

6. Fill piping for storage of Class I liquids must be set back from any building opening in accordance with National Fire Protection Association Codes 30, 30A or 31.

7. Product supply lines used in conjunction with pressurized pumping systems must be installed with a product line leak detection device. All leak detection devices must be tested for proper operation before the remote pumping system is used after initial installation and once annually thereafter. All leak detectors must be capable of detecting a leak at a rate of at least 3 gallons per hour at a line pressure of 10 psi within one hour of occurrence with a 95 percent probability of detection and a 5 percent probability of false alarm.

8. A crash valve must be installed under dispensers of pressurized pumping systems in accordance with the National Fire Protection Code 30A.

9. Conventional suction systems must have no more than one check valve per pump. The check valve must be located as close to the pump as possible, such that any leaks in the line will result in a return of product to the tank. Supply and return piping for a facility storing oil for an emergency standby generator are exempt from this

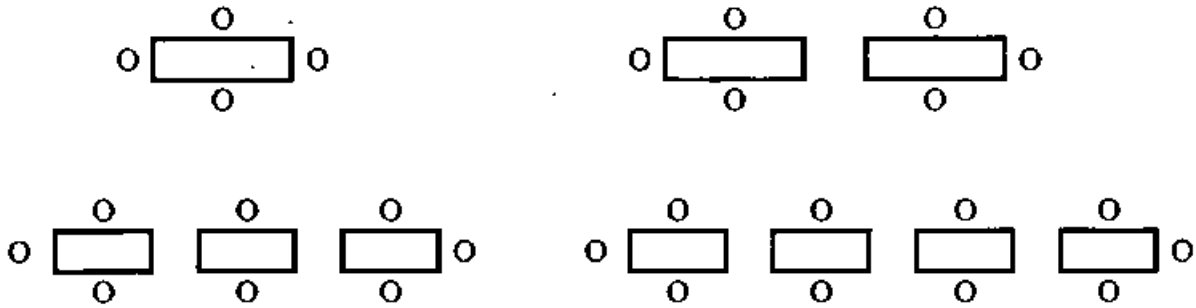
requirement if secondary containment with continuous interstitial space monitoring is provided in accordance with section 5(B)(2) of this rule.

10. When the product dispenser of a motor fuel facility is at a lower elevation than all or a portion of the tank height, an anti-siphon ("normally closed") valve must be installed as close as physically possible to the start of the down-gradient run of the product piping in order to prevent the loss of the tank contents in the event of a piping leak.

Appendix F: Specifications and Requirements for Vertical Ground Water Monitoring Wells at Existing Facilities

These requirements only apply to existing facilities, fully installed as of April 19, 1990.

1. Sufficient number of vertical ground water monitoring wells must be installed to detect a leak from every tank by including a minimum of four monitoring wells for each tank or where more than one tank is installed in the same continuous excavation, the minimum number of monitoring wells shall be installed as diagrammed below:



When more than one tank is installed in a continuous excavation hole, alternate numbers and positioning of ground water monitoring wells may be used when determined by a Maine registered professional engineer or Maine certified geologist as capable of detecting a leak or discharge from every tank and meeting the performance and installation requirements of section 5(C) of this rule. Such an alternate ground water monitoring plan must be certified by a Maine registered professional engineer or Maine certified geologist, and submitted to the commissioner as part of the facility's registration materials.

2. Monitoring wells must be a minimum of 2 inches in diameter.

3. The slotted zone must extend at least 5 feet into the water table and at least 5 feet above the groundwater surface, as determined at the time of installation; or when installed within a secondary containment liner, the slotted zone must extend to within 6 inches of the low point of the liner.

4. The screened portion of the well must be a minimum of 10 feet in length and must be factory slotted with a slot size of .010 inch.

5. Monitoring wells must be installed with a cap at the bottom of the slotted section of the well.

6. Monitoring wells must not be constructed of schedule 20 PVC "sewer" or leach field piping.

7. Monitoring wells must be constructed of flush joint, threaded schedule 40 PVC or other materials and designs approved by the commissioner.

8. Monitoring wells must be numbered such that all monitoring and testing results are easily correlated to a specific monitoring well location.

9. All monitoring wells must be equipped with liquid-proof lockable caps.

10. Monitoring wells must be properly distinguished from fill pipes.

11. The area around the screened portion of the well shall be surrounded by a porous medium (e.g. sand, gravel or pea stone).

12. The outside of the monitoring wells risers must be sealed using bentonite or a similar product to a depth of 1 1/2 feet below ground surface.

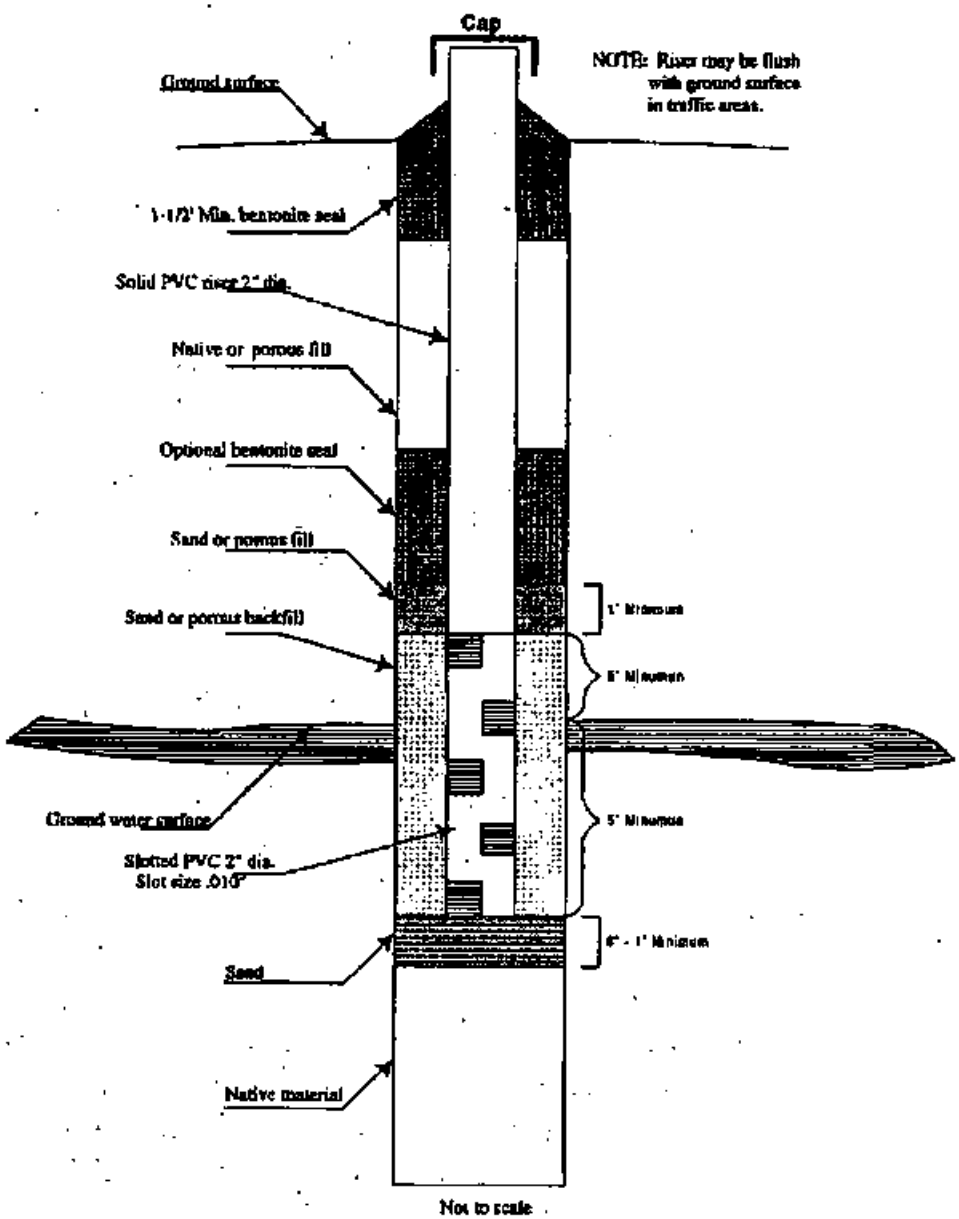
13. Monitoring wells located in traffic areas must be cut off at ground level, clearly marked, and fitted with a limited access cover in accordance with PEI Publication RP 100-2000 or properly protected from vehicles.

14. Any damaged monitoring well must be repaired or replaced as soon as possible after discovery of the damage, but at least within 45 days.

FOR INSTALLATION IN A TANK EXCAVATION

FIGURE 1

VERTICAL MONITORING WELL



Appendix G: Specifications and Requirements for Monitoring Wells with Impervious Barriers

1. Monitoring wells must be constructed in conjunction with an impermeable membrane, impervious structure or other approved device that is resistant to hydrocarbons, sloped to a sump such that all leaks or discharges will be detected in a product monitoring device (see Figure 2).

2. The impermeable barrier must slope to a 24 inch deep sump, at a slope of 1/4 inch per foot.

3. The impermeable barrier must extend 18 inches beyond each side of the tank(s).

4. The impermeable barrier must run under the entire length of the tank being monitored.

5. The barrier must be placed under the bedding material and shall not be in direct contact with the tank.

6. Monitoring wells must be constructed in accordance with the specifications and requirements of Appendix F, except that the well must be placed in the sump as illustrated in Figure 2.

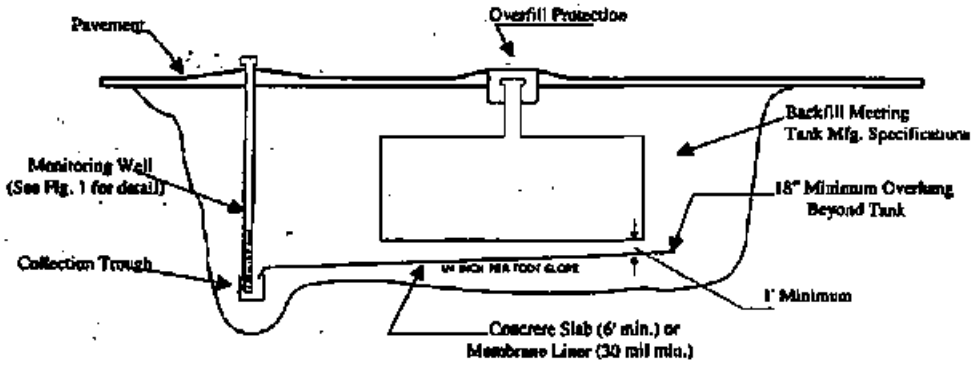
7. Any damaged or non-functioning monitoring well must be repaired or replaced as soon as possible after discovery of the damage, but at least within 45 days.

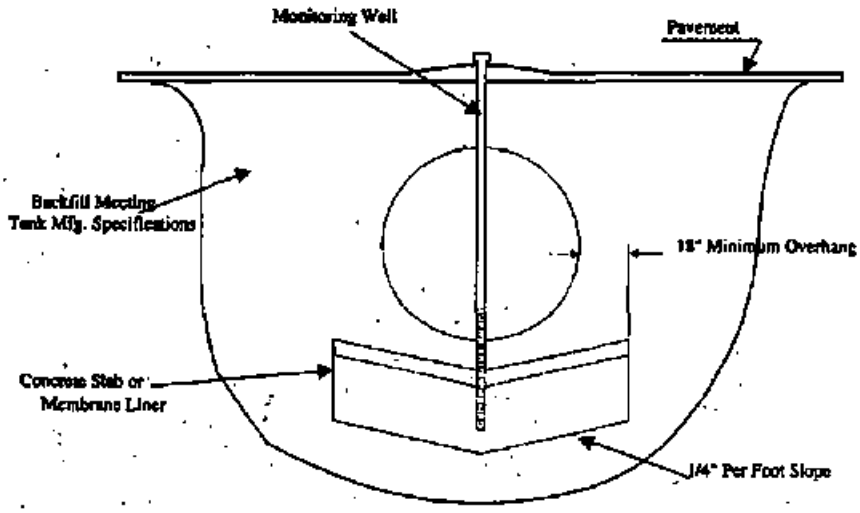
8. In locations where the seasonal high ground water table elevation is above that of the barrier, the combination of an impervious barrier and monitoring well does not qualify as leak detection under section 5(B) of this rule.

FIGURE 2.

MONITORING WELL AND IMPERMEABLE LINER

FIG. 2 MONITORING WELL AND IMPERMEABLE LINER





NOTES:

- DRAWINGS NOT TO SCALE
- FOR USE WHERE WATER TABLE IS AT LEAST 15' BELOW GRADE AND FOR INSTALLATIONS OVER BEDROCK
- OTHER CONFIGURATIONS MEETING APPENDIX G PERFORMANCE STANDARDS MAY BE ACCEPTABLE

Appendix H: Procedures for Weekly Monitoring, Handling, and Obtaining Samples for Laboratory Analysis

These procedures are specifically for manual sampling of ground water monitoring wells used as leak detection to meet the requirements of section 5(D)(14) of this rule.

NOTE: Due to the extreme sensitivity of laboratory analytical equipment, it is very important that all bailers, pumps and sample vials be kept clean. A contaminated pump or bailer may cross-contaminate monitoring wells or falsely indicate the presence of hydrocarbons in the ground water. It is also important that the person taking the sample have clean hands free of any grease, oil or gas.

For Weekly Monitoring, Perform Steps 1 through 7.

1. All equipment used shall be washed with a detergent soap and triple rinsed with water which is known to be uncontaminated to ensure the device is clean. The individual(s) performing the sampling shall wash their hands thoroughly prior to sampling.

2. Measure and record the distance from the top of the casing to the water surface.

3. Measure and record the distance from the top of the casing to the bottom of the well.

4. After checking for free product using a clear bailer and when the volume of water in the well is sufficient remove several bailer volumes of water.

5. Lower the bailer into the well and remove a sample. Pour the contents of the bailer into a clear container.

6. Inspect the sample for free product or an oily sheen. Smell the sample for olfactory evidence of oil.

7. Record the results in a logbook which, shall be kept at the facility. A sample log sheet is attached in Figure 3.

NOTE: Commercially available pastes, which change color upon contact with hydrocarbons can be spread on a weighted, plastic tape measure or measuring stick and lowered the depth of the well. Pastes are also available which will change color upon contact with water. The use of these pastes are an acceptable method of determining water levels and detecting product in monitoring wells for the purpose of complying with weekly monitoring requirements. The use of an oil/water interface probe is also acceptable.

8. Prior to obtaining samples for laboratory analysis, remove 3 well volumes of water from each well. The water may be removed by bailing or pumping the well. For 2-inch wells, remove about 2.5 gallons of water for every 5 feet of well water.

9. After a sufficient volume of water has entered the well, take a sample for analysis.

10. Samples shall be poured into vials designed for sampling volatile organics. Standard sampling vials are glass, 30-50 milliliters in volume with a Teflon cap. Obtain the sample vials from the lab where the analysis will be performed. Care shall be taken, such that no air bubbles are in the sample vial. Record the sample vial number and the monitoring well number, such that the laboratory analysis may be correlated to a specific well location.

11. Samples shall be securely packed and shipped the same day or in accordance with the protocols for the analysis being conducted. Samples shall be kept cool and not exposed to heat. A record shall be kept of all dates and shipping arrangements. Samples must be analyzed in accordance with the requirements of Appendix S of this rule.

12. For monitoring wells, which are installed with the impervious barrier, which contains less then two (2) feet of water, do not attempt to remove three well volumes of water. It may be necessary to sample the well during or after periods of rain whenever possible.

13. For monitoring wells, which do not have enough water to obtain a sample, measure the depth of the well to insure the well is not filled in or has not collapsed. Using a gauge stick or hard plastic tape, apply paste which will turn color upon contact with hydrocarbons. Record the results of both measurements for each well in the logbook.

FIGURE 3

SAMPLE WEEKLY MONITORING WELL LOG SHEET

Monitoring Well No.	1	2	3	4	5	6	7	8
1. Date of Sampling								
2. Time of Sampling								
3. Distance from Casing to Ground Water								
4. Distance from Casing to Bottom of Well								
5. Method for Determining Water Levels								
6. Instrument Cleaned (Washed and Triple Rinsed)								
7. Instrument Used (Bailer, Pump, etc.)								

8. Results of Sight and Smell Test								
9. Initials of Person Performing the Sampling								

10. Comments

Appendix I: Sample Daily Inventory Reporting Log
KEEP THIS COMPLETED FORM FOR 3 YEARS

MONTHLY FUEL REPORT/DAILY INVENTORY

Month/Year _____

Facility & Location: _____ Registration Number: _____

Tank Size and Fuel Type: _____ Certified By: _____

Date	Opening Inventory (Book Inventory of Previous Day)	Gallons Pumped	Gallons Delivered	Book Inventory Balance	Closing Stick Inventory	Cumulative Over or <Short>	Inches Water	Initials
Math Check		-	+	=				

Leak Check: Sum of Gallons Pumped (_____) x .01 = _____

IF SUM OF "CUMULATIVE OVER OR SHORT" IS GREATER THAN LEAK CHECK RESULT IT IS CONSIDERED EVIDENCE OF A POSSIBLE LEAK AND YOU MUST NOTIFY DEP AT (207) 287-2651.

Log Sheet #1

Appendix J: Requirements for Abandonment of Underground Oil Storage Tanks by Removal

1. The top of the tank must be exposed.

2. All piping must be drained and flushed into the tank or other suitable container such that no waste water or product is released to the environment (1 or 2 gallons of water should be sufficient to flush piping).

3. All liquid that can be pumped out must be removed, and any liquids that cannot be used for their originally intended purpose must be disposed of in accordance with the department Waste Oil Management Rules, Chapter 860. UL listed explosion proof equipment must be used to remove Class I liquids. Hoses to remove product must be inserted to the low end of the tank, which may still contain product. Flammable vapors from vacuum trucks removing oil from a tank or facility must be vented at least 12 feet above the ground surface, effective September 28, 1991.

4. The fill (drop) tube must be removed. Fill, gauge, and product lines must be disconnected. The open ends of all lines must be capped or plugged. All tank openings that will not be used in the inerting procedure also must be plugged. Only the vent line will remain connected and open until the inerting procedure is complete. The vent line must be at least 12 feet above the ground surface.

NOTE: Due to the potential of waste oil tank explosions, the department strongly recommends treating all waste oil tanks as a Class I liquid tank except where testing shows the internal atmosphere not to be explosive.

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5. All tanks that contained Class I liquids must be inerted prior to removing the tank from the ground using one of the following methods:

   (a) The tank can be inerted with dry ice in the amount of 1.5 pounds per 100 gallons of tank capacity. Dry ice shall be crushed and distributed evenly over the greatest possible area. During the inerting process, all necessary precautions to prevent ignition in the entire area shall be taken.

   (b) The tank can be inerted using nitrogen or another inert gas approved by the commissioner, introduced at low pressure at the bottom of the tank. Inerting is considered complete when oxygen levels in the tank are measured at less than 6 percent.

   (c) The tank can be rendered vapor free by air purging in accordance with API 1604. Air purging is considered complete when an explosimeter indicates an atmosphere inside the tank of less than 10 percent of the LEL while an oxygen meter indicates greater than 14 percent oxygen. Air purging using air-moving equipment found on a vacuum truck is not allowed.

(d) The tank can be removed if the tank atmosphere is overrich as defined by a reading greater than 15 percent product vapor by volume using a percent product vapor instrument.

NOTE: An explosimeter by itself is not considered a product vapor instrument. If uncertain of an instrument's capability for testing above the Upper Explosive Limit, contact the manufacturer.

(e) The tank can be removed if the tank atmosphere is found to be oxygen deficient as defined by an oxygen reading of less than 6 percent.

During any of the above inerting, purging or removal procedures, all necessary precautions to prevent ignition in the area must be taken, including but not limited to: grounding and bonding of equipment; use of explosion proof or intrinsically safe equipment; ambient air monitoring of the surrounding area; and pedestrian and traffic control. All weather and ambient atmospheric conditions must be evaluated prior to inerting or purging, including but not limited to air exchange, wind direction and humidity. All air monitoring instruments must be calibrated according to the manufacturer's specifications. Measurements with air monitoring instruments must be taken at the following points: one foot from the bottom of the tank; at its lowest end; the middle of the tank's diameter; and at the tank opening.

NOTE: All contaminated soil must be removed or otherwise cleaned up to the satisfaction of the department.

6. All holes, including corrosion holes, must be plugged or capped before the tank is moved from the site, except that one 1/8 inch vent hole must be left to prevent the tank from being subjected to an excessive pressure differential caused by extreme temperature changes.

7. If transported, the tanks must be scraped to remove all loose backfill material adhering to the tank.

8. All tanks removed from the ground, regardless of condition, must be labeled with the following information: Tank Has Contained Leaded Gasoline (or Flammable Liquid) NOT GAS FREE.

NOTE: U. S. Department of Transportation regulations (49 CFR Section 172.500 et seq.) also require tanks which have not been purged but are being transported to be labeled on the ends and sides with a "Flammable" placard with the appropriate UN Number (1203 or 1993) attached.

9. If transported, the tank must be secured on a truck such that the 1/8 inch vent hole is located on the uppermost point on the tank.

10. All piping must be removed from the ground whenever practicable. Piping that cannot be removed must be blown clear of residual product with an inert gas and securely plugged at all ends. All necessary precautions to prevent spillage or ignition in the entire area must be taken.

11. Some tank disposal facilities require that tanks be cleaned of sludge and residues prior to accepting the tank. Any cleaning and temporary storage operations must be performed at a site acceptable to local public safety officials and not on a sensitive geologic area, as defined in section 3 of this rule. Any cleaning operation involving flammable materials or generating flammable vapors must be performed at a remote site where public access can be restricted by fencing or other suitable means 24 hours/day. Tank cleaning may be performed at the site where the tank is removed only with the permission of the local public safety official.

NOTE: If cleaning a tank at the site of its removal, it is recommended that the tank be cleaned while still in its excavation hole, the safest location in the event of an explosion or fire.

12. The only acceptable means of disposal of underground oil storage tanks are: (a) sale to a properly approved junk or scrap dealer; (b) disposal at a tank processing facility meeting the criteria of Appendix L of these rules and approved by the department; (c) use as culverts provided that (i) tanks are steam cleaned prior to use and any resides are properly cleaned and disposed of and (ii) such use will not violate any other laws, regulations, or permits promulgated under federal, state, or local jurisdiction; or (d) other techniques for disposal of tanks, provided the expressed written approval of the department and the State Fire Marshal's office has been obtained.

13. Tanks must be stored with all bung holes open and positioned at a 45 degree angle down from horizontal to prevent rain from entering the tank and to allow vapors to escape.

Appendix K: Requirements for Abandonment of Underground Oil Storage Facilities by Filling in Place

1. Piping must be drained and flushed into the tank.

2. All liquid that can be pumped out, including that liquid requiring a hand pump to remove, must be removed and any liquids that cannot be used for their originally intended purpose must be disposed of in accordance with department Waste Oil Management Rules, Chapter 860. UL approved explosion proof equipment must be used to remove Class I tanks that may still contain product. Flammable vapors from a vacuum truck removing oil from a tank or facility must be vented at least 12 feet above the ground surface, effective September 28, 1991. All sludge will also be removed, handled, stored and disposed of in accordance with Chapter 851 of department hazardous waste rules. Where it can be demonstrated to department satisfaction that a sludge is not a hazardous waste, it may be disposed at a solid waste disposal facility licensed for such wastes.

3. The top of the tank must be exposed.

4. The fill (drop) tube must be removed. Fill, gauge, and product lines must be disconnected. Open ends of all lines, except the vent line, must be capped or plugged.

NOTE: Due to the potential of waste oil tank explosions, the department strongly recommends treating all waste oil tanks as a Class I liquid tank except where testing shows the internal atmosphere not to be explosive.

---

5. All tanks that contained Class I liquids must be rendered inert by using one of the following methods:

   (a) The tank can be inerted with dry ice in the amount of 1.5 pounds per 100 gallons of tank capacity. Dry ice shall be crushed and distributed evenly over the greatest possible area. During the inerting process, all necessary precautions to prevent ignition in the entire area must be taken.

   (b) The tank can be inerted using nitrogen or an other inert gas approved by the commissioner, introduced at low pressure at the bottom of the tank. Inerting is considered complete when oxygen levels in the tank are measured at less than 6 percent.

   (c) The tank can be rendered vapor free by air purging in accordance with API 1604. Air purging is considered complete when an explosimeter indicates an atmosphere inside the tank of less than 10 percent of the LEL while an oxygen meter indicates greater than 14 percent oxygen. Air purging using air-moving equipment found on a vacuum truck is not allowed.

(d) The tank can be considered inert if the tank atmosphere is found overrich as defined by a reading greater than 15 percent product vapor by volume using a percent product vapor instrument.

NOTE: An explosimeter by itself is not considered a product vapor instrument. If you are uncertain of an instrument's capability for testing above the Upper Explosive Limit (UEL), contact the manufacturer.

(e) The tank can be considered inert if the tank atmosphere is found to be oxygen deficient as defined by an oxygen reading of less than 6 percent.

During any of the above inerting, purging or removal procedures, all necessary precautions to prevent ignition in the entire area shall be taken, including but not limited to: grounding and bonding of equipment; the use of explosion proof or intrinsically safe equipment; ambient air monitoring of the surrounding area; and pedestrian and traffic control. All weather and ambient atmospheric conditions must be evaluated prior to inerting or purging, including, but not limited to, air exchange, wind direction, and high humidity. All air monitoring instruments must be calibrated according to the manufacturer's specifications. Measurements with air monitoring instruments must be taken at the following points: one foot from the bottom of the tank; at its lowest end; the middle of the tank's diameter; and at the tank opening.

6. Vapors from the tank must be vented at least 12 feet above the ground surface.

7. A suitable, solid, inert material must be introduced through the hole in the top of the tank. The following materials are suitable for this purpose:

(a) Sand. Sand that is free of rocks is suitable for filling. It may be poured dry as long as it flows freely. When the tank is nearly full, sand should be washed into the tank with a nominal amount of water and puddled to cause the sand to flow to the tank ends. The use of large amounts of water must be avoided.

(b) Sand and Earth Fill. The tank can be (1) filled with sand to about 80 percent of the calculated capacity, and (2) filled to overflowing for the remaining capacity using a mixture of soil and water in a free-flowing mud.

(c) Cement or mortar.

Appendix L: Requirements for Underground Oil Storage Tank Processing Facilities

1. Applicability.

   A. The requirements of this Appendix apply to underground oil storage tank processing facilities where tanks used for the storage of oil and abandoned by removal are cleaned, temporarily stored and processed prior to recycling or re-use of their materials.

   B. For the purpose of this appendix, the cleaning operation of a tank processing facility includes those areas and activities where vapors, liquids, solids, sludge, rust, scale and other residues are removed and cleaned from an abandoned underground oil storage tank, including buffers, structures, roads and equipment.

   C. For the purpose of this Appendix, the processing operation of a tank processing facility includes those areas and activities where cleaned tanks are cut, crushed, reduced in volume or otherwise modified prior to sale or re-use of their materials.

2. Siting. Underground oil storage tank processing facilities may not be located:

   A. On a coastal sand dune, as defined in 38 M.R.S.A., section 480-B(1);

   B. On a coastal wetland as defined in 38 M.R.S.A., section 480-B(2);

   C. On a freshwater wetland, as defined in 38 M.R.S.A., section 480-B(4);

   D. On a flood plain, as defined in Chapter 400 of the department rules;;

NOTE: In most areas of Maine, the flood plains have been mapped by the Federal Emergency Management Agency (FEMA). Maps are available at most municipal offices.

   E. Within a public water system's source water protection area as mapped by the Maine Bureau of Health, or a sensitive geological area as defined in section 3(QQ) of this rule;

   F. Within 300 feet of a classified body of surface water as defined in Chapter 400 of the department rules; or

   G. Within 100 feet of an adjacent property boundary.

NOTE: If the area of a facility, including all operations, temporary storage areas, structures, roads and buffers exceeds 3 acres, the owner also must obtain approval under the Site Location of Development Law, 38 M.R.S.A., sections 481 et seq., and the Maine Waste Management Law, 38 M.R.S.A., sections 1302 et seq.

3. Design

A. The entire facility must be surrounded by a fence or otherwise secured to the commissioner's satisfaction to prevent unauthorized access to the tanks. Signs stating "Caution - Flammable Materials", "No Smoking" and "No Entry of Unauthorized Personnel" must be placed along the fence at intervals no greater than 50 feet.

B. A 25-foot fire protection buffer must be cleared of combustible materials on all sides of the facility. This buffer must be maintained at all times free of all structures, equipment, cleaned tanks and other facility activities. Overhanging branches and vegetation must be cut back to distances safe from fire and explosion. The fire buffer may lie outside the fenced portion of the facility.

NOTE: Graveling the area and removing the vegetation are examples of means that would normally achieve this purpose.

C. The facility must be equipped with fire protection equipment of the size, quantity, type and location directed by local fire officials or by the commissioner. Equipment must be kept operable at all times.

D. The facility must be equipped with a means of communication (such as a telephone or two-way radio) with fire and medical emergency personnel.

E. A contingency plan meeting the requirements of 40 CFR 264.52 must be developed to provide for prompt response to fire and explosion hazards, and for containment and removal of any spilled material. A copy of the contingency plan must be sent to the commissioner and to local public safety officials. A copy must be kept at the facility at all times.

F. Cleaning Operations Design

(1) Any area underlying a cleaning operation must be surrounded by a berm of sufficient height to contain all residues, cleaners and precipitation that may be contaminated by these substances. This area and berm must be underlain by a clay or synthetic liner, which in turn must be completely covered by a firm, continuous working surface (such as concrete) that is compatible with hydrocarbons. The area must be equipped with a collection system which

contains for removal of all solid and liquid tank residues, cleaners, and all precipitation that may be contaminated by these substances.

(2) A clay liner must be at least two feet thick and must have a permeability no greater than 10^{-7} cm/sec. A synthetic liner must be at least 40 mils thick and must be of a material compatible with all residual tank contents and cleaners. It must be installed in accordance with the manufacturer's specifications. An independent professional engineer or authorized liner manufacturer's representative shall observe the entire installation and testing, and shall certify to the department that the installation, testing and repairs occurred in accordance with the manufacturer's specifications. Either a clay or synthetic liner must extend at least 10 feet in all directions beyond all tanks requiring containment, and must be anchored to the berm in a secure fashion.

(3) The collection sump, tanks, and all equipment must be of adequate size to contain the volumes of tank residues, cleaners, and any contaminated precipitation that will be generated. They must be constructed of materials compatible with the wastes generated.

(4) A tank is deemed clean when:

(a) all loose scale has been removed from the inside of tank walls;

(b) all solid and liquid residues have been removed from tanks walls; and

(c) the tank has been ventilated by air, steam, or some other means so that its atmosphere does not exceed 10% of the Lower Explosive Limit (LEL).

G. Processing Operations Design

(1) Processing operations areas must be physically isolated from the cleaning operations area such that no flammable or explosive hazards exist in the processing areas due to cleaning operations.

(2) Processing operations areas need not be lined, but must be maintained in a manner so that processing debris (e.g. cuttings, etc.) can be collected and removed.

H. Temporary Storage Area Design

(1) Tanks at a processing facility may be temporarily stored on site for less than 12 months, provided the following conditions are met:

(a) All tanks must be stored in a "chocked" condition to prevent rolling, and must have the top openings (manufactured openings or bungs) open and located at a 45 degree angle from the ground to prevent rainfall from

entering and to facilitate venting. Any corrosion or non-manufactured holes must be plugged.

(b) A 3-foot separation must be maintained between all tanks to allow weekly inspection for leakage and cleanup of spills. Any tanks found to be leaking must be immediately cleaned in accordance with these rules.

(c) Any discharge of oil to soil or groundwater in any unlined portion of the facility must be immediately reported and removed to department satisfaction.

(2) Under no circumstances must a tank be stored or remain at a facility for a period exceeding 1 year from the date of the tanks arrival at the facility.

4. Operation

A. All tanks arriving at a processing facility must be brought immediately into a secured area and inspected. The inspector shall note tank condition (severe corrosion, splits, number and size of holes) and evidence of leaks such as product on outside tank surfaces, or adhering contaminated soil. This information must be recorded in a facility log book.

B. Following inspection, all tanks must be marked conspicuously and permanently with a serial number assigned by the facility, date of receipt and product last stored, if known.

C. Any tanks containing liquids must be pumped dry immediately following inspection. Any pumping or removal of liquids must be conducted in a lined portion of the facility. Any liquid-free tanks may then be brought to a temporary storage area provided they are stored in accordance with Appendix L section 11(H) of this rule.

D. Solid and liquid residues from tank cleaning or processing will be disposed of in compliance with appropriate federal, state and local laws, regulations and ordinances. All residues are presumed to be hazardous waste, requiring disposal under the provisions of the department Hazardous Waste Management Rules, Chapters 850-857, unless testing or other information establishes, in accordance with Chapter 850, that they are not.

NOTE: Sludge and solid wastes found to be non-hazardous are special wastes subject to the requirements of Chapter 405 of the departments rules. Liquid petroleum wastes found to be nonhazardous are waste oils subject to the requirements of Chapter 860 of department rules.

E. After tank identification, cleaned tanks must be brought to the processing operation area unless stored in accordance with paragraph C above. Tanks not cleaned upon arrival must be taken to a cleaning operations area, unless stored in accordance with paragraph C above.

F. The facility must maintain a log book at the facility at all times. It must be kept current and made available to department inspectors upon request. The log book must contain the following information for each tank:

(1) facility-assigned serial number;

(2) location from which tank was removed;

(3) tank size;

(4) contents when last in use;

(5) tank condition upon arrival (e.g. sound, badly corroded, number of holes);

(6) date cleaned;

(7) date processed; and

(8) final disposition (sold whole, cut up, crushed).

In addition the log book must include information on types and volumes of all residues generated, how they were disposed of, and when. All records must be kept for at least three years.

G. Groundwater monitoring must be conducted at the facility. A ground water monitoring plan, developed and certified by a Maine certified geologist, must be submitted to the commissioner with the facility application. The plan must provide for a minimum of one upgradient and three down-gradient wells, located and screened to detect releases of hydrocarbons as early as practicable.

Appendix M: Cathodic Protection Tester Certification Requirements

1. The requirements of this Appendix apply only to individuals not certified by the Maine Board of Underground Tank Installers for underground oil facility installation. Maine certified installers are considered to automatically meet the definition of a cathodic protection tester as long as their installer certification remains valid.

2. An underground storage tank inspector is approved by the commissioner as a cathodic protection tester when certified by the Maine Board of Underground Storage Tank Installers in accordance with 32 M.R.S.A. section 10010(6)(C).

Appendix N: Corrosion Expert Certification Requirements

1. The commissioner may certify a person as a corrosion expert on finding that the person has a thorough knowledge of the physical sciences and the principles of engineering and mathematics acquired by professional education and related practical experience and is qualified to engage in the practice of corrosion control on buried or submerged metal piping systems and metal tanks. Only individuals may be certified.

2. Criteria for certification by the commissioner.

   A. Documentation of valid certification by the National Association of Corrosion Engineers (NACE) as a qualified corrosion expert; or

   B. Registration as a professional engineer in Maine, and certification or licensing, by a professional organization or educational institution other than NACE, based on adequate education and experience in corrosion control of buried or submerged metal piping systems and metal tanks.

3. Application procedures:

   A. On an application form provided by the commissioner, applicants must provide the following information and certify its accuracy.

      (i) Applicant's name, business mailing address, and telephone number;

      (ii) Documentation of NACE or other professional or educational institution's certification;

      (iii) Documentation of Maine registration as a professional engineer, if needed;

      (iv) Description of relevant work experience, college courses (including transcript) and other technical training courses; and

      (v) Three written professional references.

   B. Upon the review and approval of an application as meeting all the certification criteria of this rule and 38 MRSA, section 567-A(2), the commissioner shall issue a certificate valid for 12 months.

   C. Requests for recertification must be made to the commissioner in writing 30 days prior to expiration of the existing certificate. The commissioner may deny a request for recertification request on any one of the following grounds: a documented improper installation of corrosion protection not in accordance with the requirements of this rule; the expiration or loss of NACE or other professional certification; or loss of a valid professional license as a registered Maine

professional engineer. An individual who has lost his or her certification may reapply after 12 months for recertification consistent with requirements of paragraph 2 above.

D. The commissioner may undertake enforcement actions corrosion experts for violations of this rule, in accordance with the provisions of 38 MRSA, subsection 347-A.

Appendix O: Design and Installation Standards for Secondary Containment Using an Excavation Liner

1. Tank and piping excavation liners must be constructed of synthetic materials, compatible with the product to be stored and sufficiently thick and impermeable to direct a leak or discharge to a monitoring point and permit its detection. Soil, clay, bentonite-sealed soil and asphalt liners are prohibited.

2. Liners must have a permeability of 10^{-6} cm/sec or less for the product to be stored. Concrete excavation liners must be sealed or coated on the inner wall with an oil compatible sealant or coating compound.

3. Synthetic liners must be at least 0.03 inches thick and installed in accordance with manufacturer specifications. All liner panels must be factory seamed or field seamed by an authorized representative of the manufacturer.

4. For cathodically protected tanks and piping, the liner must be installed so that it does not interfere with the proper operation of the cathodic protection system. Sacrificial anodes must be located within the excavation liner.

5. Ground water, soil moisture, or rainfall must not render the interstitial leak detection or sampling method inoperative so that a release could go undetected for more than 30 days.

6. The site must be assessed to ensure that the secondary liner is always above the ground water and not in a 25 year flood plain, unless the liner and leak detection system are designed for use under such conditions.

7. Monitoring wells to be used for leak detection in tank excavation liners must be designed and installed in accordance with Appendix F of this rule.

8. For tanks with an internally fitted liner, continuous, automated leak detection between the liner and the inner wall must be provided.

9. Excavation liners for piping must drain to a monitoring sump or to the interstitial space monitoring system for the tank.

Appendix P: Requirements for a Site Assessment at Facility Closure or Tank Abandonment

1. The purpose of a site assessment at the time of facility closure or abandonment is to determine if discharges of oil have occurred requiring notification of the commissioner and corrective action by the owner, operator or another responsible party.

2. General requirements:

   A. A site assessment meeting all the requirements of this Appendix must be completed prior to the completion of facility closure or the abandonment of any portion of a facility in accordance with section 11 of this rule. This would include abandonment of only piping.

NOTE: See the accompanying chart on the following page for a summary of the site assessment requirements of this Appendix.

   B. Site assessor qualifications. If a tank or facility is located within a sensitive geologic area, as defined by this rule, the site assessment must be supervised by, and the site assessment report must be certified by, a Maine certified geologist, registered professional engineer, or other persons meeting the requirements of Maine's professional regulation statutes and regulations for geologists or professional engineers practicing in Maine. As provided under 38 M.R.S.A., subsection 563-B(1), closure site assessment for facilities not located in a sensitive geologic area are exempt from the above qualification standards for the person conducting the assessment.

   C. The findings of all site assessments conducted pursuant to this rule must be presented in a written report with supporting data, addressing the requirements of this Appendix.

   D. One copy of all site assessment reports conducted pursuant to this rule must be submitted to the commissioner in an envelope endorsed "UST Site Assessment", by the facility owner at the following address within 45 days of tank and piping removal or abandonment in place: UST Program Administrator, MDEP-BRWM, 17 SHS, Augusta ME 04333-0017.

   If a site assessment finds evidence of a discharge, two additional copies of the site assessment report must be submitted at the same time, one to the commissioner at the above address and one to the chief municipal official of the municipality within which the facility is located or to the county commissioners if located in an unorganized township.

   E. Site assessment reports must follow the following general format:

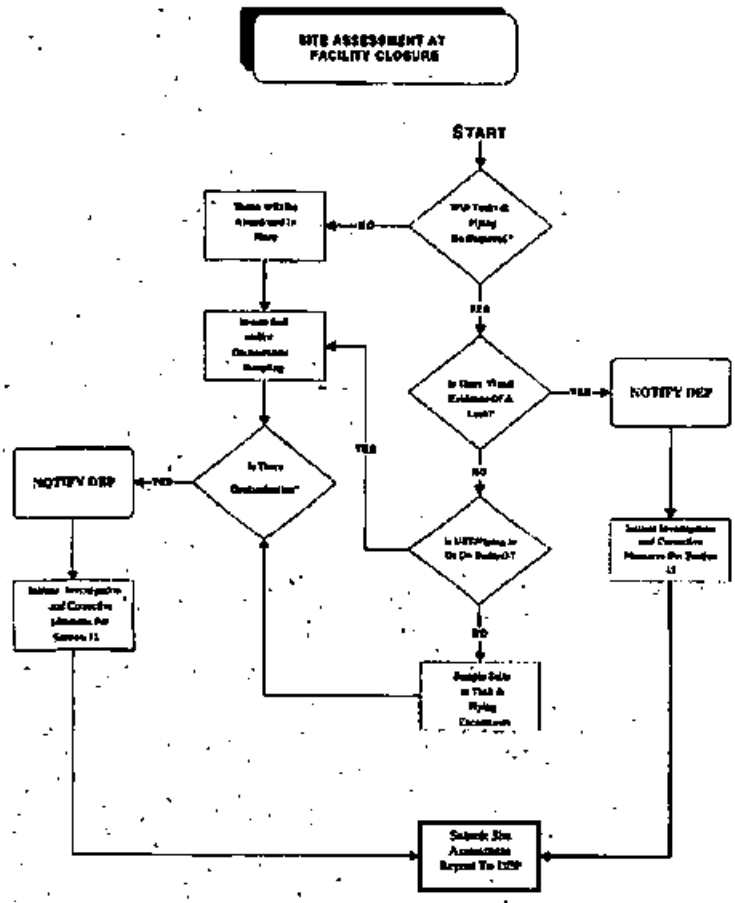
(1) Summary cover sheet including owner, operator and facility name, Maine facility and tank registration numbers, date of site assessment and whether evidence of a discharge or leak was found;

(2) Purpose of site assessment;

(3) Facility and site location;

(4) Facility and site history;

(5) Description of the site assessment methods utilized, including field instrument methods, laboratory methods and quality assurance/quality control (QA/QC) procedures followed;



NOTE: This chart summarizes the process of conducting a site assessment at the time of closure or abandonment of a tank or facility. It is for general information only and should not be relied upon without reference to the rest of the appendix.

(6) Findings of site assessment; and

(7) Recommendations and conclusions.

3. The following information must be included in all site assessments:

A. Mailing and street address of facility;

B. Tax map and lot number;

C. U.S. Geological Survey 7 1/2 minute (15 minute if 7 1/2 minute is not available) topographical map showing the precise location of the facility ; and

D. A facility layout plan showing locations of property boundaries, tanks, product and vent lines, dispensers, on-site wells or surface water bodies, subsurface waste water disposal systems, dry wells, sewer lines and underground utilities.

4. The following additional land use information must be provided where evidence of a discharge of oil has been found:

A. A description of surrounding land uses and the extent of public drinking water service to all abutters and the surrounding area;

B. The location of possible contamination receptors including, at a minimum, private water supplies within 300 feet of the facility, public water supplies within 2000 feet of the facility, surface water bodies, utility conduits, and structures with a basement or crawl space; and

C. A determination if the facility is located in a sensitive geologic area as defined by this rule.

5. If evidence of a discharge of oil is found, the site assessment must also include the following facility and site history information:

A. History of site ownership and operation, if known, for previous 10 years, including:

(1) Name, current mailing address of all current site and facility owners and operators; and

(2) Years of ownership and operation of each previous owner and, if known, operator.

B. Past and present land use(s) of site and facility.

C. Current and past product storage and distribution system, including:

(1) Date of installation of all tanks;

(2) Tanks or piping abandoned in place;

(3) Size and construction of tanks and piping;

(4) Type and length of time specific oil products stored;

(5) Summary of results of daily product inventory reconciliation for the operating life of current and if available, previous facilities;

(6) Tank and piping repairs, replacements and/or removals, and the condition of removed or repaired facility components for the operating life of the facility, if known;

(7) All precision test results, if performed, for previous and current facility, if available;

(8) Availability and results of leak detection monitoring if any, including ground water monitoring wells;

(9) Other evidence of a leak or discharge as defined in section 5(D)(~~9~~11) of this rule, and associated with the current or a previous facility at the same location;

(10) Date and description of all known leaks or discharges on the site including type of oil, quantity lost and recovered, cleanup actions taken and off-site effects, if any; and

(11) Summary of work performed and results of previous site assessments and contamination investigations.

D. A completed copy of the department report form documenting the department's initial decision concerning the need for and goals of remediation for contaminated soil and, if applicable, ground water.

6. Site assessment requirements when tanks or piping are removed:

A. Tanks, piping and other underground facility components must be inspected visually upon removal for presence of holes, loose fittings and joints, cracks, fractures and evidence of oil stains. If any of the conditions above are found the facility owner or operator shall notify the commissioner of the occurrence of a discharge within 24 hours of discovery.

B. The tank and piping excavation must be inspected visually for any evidence of a discharge of oil, including oil stained or saturated soil, strong petroleum vapors emitted from soil or an oil sheen on groundwater in the excavation. The presence of any of the above conditions is considered an indication of a discharge of oil and must be reported to the commissioner within 24 hours of discovery by the facility owner or operator and before the excavation hole is filled. The owner shall immediately proceed with an investigation and corrective action measures in accordance with section 12 of this rule.

NOTE: OSHA regulations governing entering excavations and confined spaces should be strictly followed. Excavations should not be entered if above 20% of Lower Explosive Limit (LEL), or less than 19.2% or greater than 25% oxygen.

C. The entire facility must be inspected visually for surface spills and discharges. Such spills and discharges must be reported to the commissioner in accordance with section 12(A).

D. Upon visual discovery of evidence of a leak or discharge of oil at a heavy oil facility and reporting such to the commissioner, the site assessment investigation at the time of closure may be terminated, except where a tank or piping was located on or in bedrock in which case the presence of contaminated ground water must be investigated in accordance with paragraph 6(E). At all other facilities, investigations must proceed further as required by this paragraph.. The tank and piping excavation areas must be screened for oil vapors using a field instrument, such as a flame ionization detector (FID) or photoionization detector (PID), calibrated to set points established or approved by the commissioner for the instrument make and the type of oil. Samples must be collected from areas showing the highest readings and analyzed by laboratory analysis, or using the field methodologies described in Appendix Q or another method of similar accuracy and sensitivity approved by the commissioner. The commissioner must be notified by the owner or operator within 24 hours of any laboratory analysis or field jar or polyethylene bag headspace reading equal to or exceeding a notification level shown in the table below. Readings below the notification level do not need to be reported to the commissioner if there is no other evidence or indication of a discharge at the facility. When using a field method for analysis of soil suspected to be contaminated with more than one of the oil products listed in the table below, the notification level for the least volatile oil must be used. Only laboratory results analyzed by a method meeting the requirements of Appendix S will be accepted.

Notification Levels (ppm)

Soil Contaminant	FID	PID	Laboratory
gasoline	100	100	5
kerosene	100	100	10
#2 fuel oil / diesel	100	100	10
waste oil	NA	100	10

NOTE: A list of PID instruments and their calibration set points is available from the department. The department also has developed a protocol whereby manufacturers of other instruments may generate calibration data for department evaluation.

E. Where a tank or piping run has been installed on or in bedrock without adequate soil backfill or bedding to test for contamination, a minimum of two down gradient ground water monitoring wells must be installed under the supervision of a Maine certified geologist or Maine registered professional engineer. Additional wells may be required by the commissioner for tanks with more than 20,000 gallons capacity. Monitoring wells must be sampled for visual and olfactory evidence of oil as well as for dissolved phase product using a hydrocarbons laboratory analysis method meeting the requirements of Appendix S and appropriate for the oil products stored at the facility in the past. Other comprehensive hydrocarbon laboratory methods may be used if approved by the commissioner. If gasoline was stored at the facility, analyses must include methyl tertiary butyl ether (MTBE) and benzene. The detection of oil must be reported to the commissioner within 24 hours by the facility owner or operator. This subparagraph applies to all facilities required to do a site assessment, including heavy oil facilities.

7. Site assessment requirements when tanks and piping are abandoned in place:

A. The requirements of this section apply whenever a facility or any portion of a facility are abandoned in place and are not removed. If a tank, piping section or other underground component is not removed, these requirements only apply to that particular portion of the entire facility.

B. All visible portions of the facility must be inspected for evidence of a leak, spill, overfill or other discharge, including areas around the fill and vent pipes.

C. Evidence of contaminated soils from a tank leak must be determined by either of the methods below:

(1) A minimum of two soil borings must be made per tank, located as close as technically feasible to intersect any oil contamination from the surface to below the estimated depth of the tank bottom or to bedrock or below the groundwater table, whichever is shallower. Additional number of borings may be required by the commissioner for tanks with more than 20,000 gallons capacity. The borings must be logged and screened continuously for oil vapors using a photo or flame ionization field instrument as removed from the ground. A sample must be taken from soil showing the highest reading for the jar headspace analysis using the method outline in Appendix Q or another commissioner approved method of comparable accuracy and sensitivity.

(2) Other subsurface investigation methods approved by the commissioner.

D. If piping is not removed such that entire excavation can be inspected, then a soil gas survey must be conducted along the length of the excavation where physical soil characteristics, ground water depth and product type allow. An alternate subsurface investigation may be conducted in lieu of a soil gas survey if approved by the commissioner.

E. When a facility was installed on or into bedrock, when borings encounter bedrock before reaching an elevation below that of the bottom of the tank or piping, or when ground water is encountered prior to reaching the depth below that of the tank or piping; a minimum of two ground water monitoring wells must be installed down gradient, as close as feasible. For tanks greater than 20,000 gallons capacity, the commissioner may require additional monitoring wells. Monitoring wells must be sampled for visual and olfactory evidence of oil as well as for dissolved phase gasoline, diesel fuel or heating oil, depending on the oil products stored at the facility in the past. If gasoline was stored at the facility, analyses must include methyl tertiary butyl ether (MTBE). Only results from a laboratory method meeting the requirements of Appendix S will be accepted. The detection of oil must be reported to the commissioner within 24 hours by the facility owner or operator.

F. When the above site assessment procedures for a facility to be abandoned in place are not technically feasible, another procedure may be used when approved by the commissioner prior to the initiation of facility closure.

8. When technically feasible and cost-effective, the commissioner may require ground water sample location and quality data to be submitted in an electronic form compatible with the Maine Geographic Information System and Ground Water Database. The format for such data will be provided by the commissioner.

Appendix Q: Field Determination of Soil Hydrocarbon Content by Jar/Poly Bag Headspace Technique

1. Introduction. The following is a procedure acceptable to the commissioner for determination of the hydrocarbon content of soils contaminated only by oil and petroleum products. A soil sample is placed in a sealed jar or polyethylene bag and the volatile hydrocarbons are allowed to come to equilibrium with the jar headspace. The headspace hydrocarbon concentration is then measured with a calibrated photo- or flame-ionization (PID or FID) instrument, approved by the commissioner.

2. Applicability. This procedure is intended for estimating gasoline, #2 heating oil, diesel fuel, kerosene, and other chemically and physically similar oil contamination in mineral soils, having water contents between bone-dry and saturation. The procedure is not intended for estimating concentrations of heavy oils, lubricating oils, waste oil, and other low volatility hydrocarbon products. Soil grain size distribution and organic carbon content may effect the partitioning of hydrocarbon between soil, liquid, and vapor phases. Weathering of the hydrocarbon product also will decrease the proportion of volatile and soluble constituents, thereby decreasing instrument response. None of these limitations invalidate the method as a technique for approximation of low-level petroleum hydrocarbon concentrations.

3. Equipment Required.

   A. Shovel; trowel;

   B. Lab containers (VOA or SVOA) of type and quantity for hydrocarbon to be sampled at expected concentrations;

NOTE: Laboratory should be consulted in advance to determine their needs.

   C. Metal dial-type thermometer, -10°C to 50°C;

   D. (Jar headspace method only) Glass, wide-mouthed, metal screw-top, 16 oz. jars, with cardboard lid liner removed, and 1/4" hole drilled through center of lid;

   E. (Jar headspace method only) Roll of heavy duty aluminum foil;

   F. (Poly bag method only) 1-quart, Zip-Lock® type polyethylene bags;

   G. Means of measuring 250 gm soil sample, plus or minus 10 gms. (e.g., a "calibrated" container, a "Weight Watchers" spring balance);

   H. Photoionization (PID), or flame ionization (FID) instrument approved by the commissioner;

NOTE: A list of approved instruments and their calibration set points is available from the commissioner. The department also has developed a protocol whereby manufacturers of other instruments may generate calibration data for commissioner evaluation and approval. Copies are available from the Bureau of Remediation and Waste Management.

I. Calibration equipment for instrument chosen; and

J. Decontamination equipment including soapy water and clean distilled water in squirt bottles or pressurized canisters.

4. Analytical Procedure.

A. Determine the location at which the sample is to be taken. If possible, identify an uncontaminated location at the same site from which soil of similar texture and moisture content can be obtained, to serve as a field "blank".

B. Measure a 250 gm. sample of the soil into a wide-mouthed jar or polyethylene bag. In so far as possible, samples should be mineral soil free of vegetation and stones larger than 1/2" in diameter. Seal the samples immediately in the jars by placing a square of foil over the mouth and screwing on the lid, and the bag by zipping the closure. Sufficient air should be left in the bag so that the instrument can withdraw an adequate headspace sample.

C. Repeat this procedure for three (3) more samples, all gathered within a 2'x2' area.

D. Shake the jars for 30 seconds to thoroughly mix the contents. If bags are used, they may be kneaded until the contents are uniform.

E. Measure the samples' temperature by sacrificing one jar or bag. If necessary, adjust all sample temperatures to between 15°C and 25°C by bringing sample containers into a warm vehicle or immersing in a water bath. In warm weather, samples should be kept in a shaded, ventilated area during headspace development and analysis.

F. Allow at least 15 minutes but not more than 1 hour for soil hydrocarbons to reach equilibrium with the headspace.

G. If samples are to be taken for laboratory analysis, they should be collected and preserved per laboratory protocols at this time. Preferably, these samples should bracket a wide range of hydrocarbon concentrations including the highest and lowest concentration at the site.

H. Warm up and calibrate the PID or FID instrument to be used to the calibration set point determined by the commissioner for the make of instrument in use and the product(s) present at the facility.

NOTES:

1. These calibration set points have been established by testing the instruments against weathered petroleum headspace surrogates. Therefore, no conversion of the readings to their benzene equivalent is necessary.

2. The UV source in PID instruments should be cleaned at least weekly per the manufacturer's recommended procedure. Both PID and FID instruments must be recalibrated after four hours of continuous use, as well as at the beginning of field use, since their calibration may drift with battery condition.

I. Shake the jars or knead the bags again for thirty (30) seconds.

J. Measure the samples' headspace concentration. If the jar headspace technique is used, break the foil seal through the drilled hole in the jar lid using a pencil or nail. Insert the instrument's probe about 1/2" into the jar. If using the poly-bag technique, insert the probe through the bag opening while squeezing the bag tight around the probe. Record the highest reading that remains steady for 1-2 seconds (i.e., that is not due to instrument needle inertia). Repeat this step until all jars have been measured.

NOTE: Both PID and FID instruments withdraw a headspace sample from the jar. In the jar headspace technique, air replaces this sample, diluting the headspace as it is being measured. In the poly-bag technique, the bag collapses as its headspace is used by the instrument. In either case it is important to obtain an instrument reading immediately after the seal is broken -- preferably within 10 seconds. Once a jar or bag has been used, it may not be used again, even if sufficient time is allowed to re-establish headspace equilibrium.

K. Repeat all steps at each other location of interest at the site. Finally, repeat all steps for the "field blank" obtained from the uncontaminated location.

L. Average the three readings obtained from each soil sample within each 2'x2' area. Blank results must be reported but must not be used to adjust the readings obtained on other samples.

NOTE: Because calibration set points have been established by testing the instruments against weathered petroleum headspace surrogates, no conversion of the readings to their benzene equivalent is necessary.

Appendix R: List of National Standards and Codes Cited

1. American National Standards Institute (ANSI), 1430 Broadway, NY 10018

   - Chemical Plant and Petroleum Refinery Piping, ANSI/ASME B31.1, 2001.

2. American Petroleum Institute (API), 1220 L Street, Northwest, Washington, DC 20005-40.

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   - Installation of Underground Petroleum Storage Systems, API Publication 1615, 5th Edition, 1996;
   - Bulk Liquid Stock Control at Retail Outlets, API Recommended Practices 1621, 5th Edition, May 1993.
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   - Pressure Testing of Liquid Petroleum Pipelines, Recommended Practice 1110, 4th Edition, 1997.
   - Design, Construction, Operation, Maintenance, and Inspection of Terminal & Tank Facilities, API Standard 2610, 1st ed., July 1994.

3. National Association of Corrosion Engineers (NACE) International, 1440 South Creek Drive, Houston, Texas 77084-4906.

   - Standard Recommended Practice, Corrosion Control of Underground Storage Tank Systems by Cathodic Protection, NACE Standard RP-0285-2002 Edition
   - Standard Recommended Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems, NACE Standard RP 0169-2002.
   - Standard Test Method, Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Tank Systems, NACE Standard TM0101-2001.

- Standard Test Method, Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems, NACE Standard TM 0497-2002.

4. National Fire Protection Association (NFPA), 11 Tracy Drive, Avon, MA 02322.

   - Flammable and Combustible Liquids Code, NFPA 30-2009~~3~~

   - Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A-2009~~3~~.

   - Standard of the Installation of Oil Burning Equipment, NFPA 31, 2001.

5. Petroleum Equipment Institute (PEI), P. O. Box 2380, Tulsa, Oklahoma 74101.

   - Recommended Practices for Installation of Underground Liquid Storage Systems, PEI Publication RP 100-2009~~5~~,

6. Steel Tank Institute (STI),5700 Oakwood Rd, Lake Zurich, IL 60047.

   - Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems, R892-91.

   - Act 100S specification of External Corrosion Protection of FRP Composite, Steel USTS, F894-02.

7. Underwriters Laboratories Inc. (UL), 333 Pfingsten Road, Northbrook, Illinois 60062-2096.

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   - Nonmetallic Underground Piping for Flammable Liquids ; UL Standard 971, ~~October 30, 1995~~ as revised through March 2, 2006.

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   - Flexible Underground Hose Connectors, UL Canada Standard CAN/ULC-S633, 1999.

Appendix S: Department Approved Laboratory Analytical Methods and Performance Standards for Analyses of Oil and its Constituents in Water and Soil

1. All chemical laboratory analyses of soil and water samples required by these rules must meet the requirements of this Appendix. Sampling and analyses will be conducted in accordance with quality assurance procedures approved by the commissioner. The commissioner may require test methods and parameters other than those listed in this Appendix to address site specific circumstances.

2. Diesel fuel, heating fuel and waste oil sample testing. Acceptable laboratory methods for the analysis of soil and water for contamination include those listed below.

   A. Modified Method for Determination Diesel Range Organics (DRO), Maine Health and Environmental Testing Laboratory (HETL) Method 4.1.25, Sept. 6, 1995.

   B. Waste oil that is not suspected of being a hazardous waste is to be analyzed using the same method as for Diesel Range Organics, HETL Method 4.1.25.

   C. Heavy oils in soil only, by U.S. Environmental Protection Agency Method 418.1, Total Petroleum Hydrocarbons (TPH).

   D. Heavy oil - TPH (418.1) will not be accepted for water analyses because of high detection limit (1 ppm).

   E. Other laboratory methods for diesel fuel range organics, waste oil and heavy oil approved or required by the commissioner, such as indicator parameters, for specific site conditions or circumstances.

3. Gasoline and gasoline constituents sample testing. Acceptable laboratory methods for the analysis of soil and water contamination include those listed below.

   A. Modified Method for Determining Gasoline Range Organics (GRO), Maine Health and Environmental Testing Laboratory (HETL) Method 4.2.17, Sept. 6, 1995.

   B. MTBE - U. S. Environmental Protection Agency Method 8260

   C. Benzene -U. S. Environmental Protection Agency Method 8260

   D. BTEX -U. S. Environmental Protection Agency Method 8260

   E. Other laboratory methods for testing for the presence and concentrations of gasoline or its constituents, approved by or required by the commissioner, such as indicator parameters for specific site conditions or circumstances.

4. Other soil or water analytes. When testing for analytes other than those listed in paragraphs 2 and 3 above, the laboratory methods must be approved by the commissioner prior to the collection of samples.

5 Performance standards.

A. For water analyses by the GRO or DRO Methods, the Minimum Reporting Level (MRL), as defined in the Methods, is to be equal to or lower than the Maine Bureau of Health's published Maximum Exposure Guidelines (MEG), a commissioner approved site specific clean-up standard, or an alternate performance standard approved by the commissioner.

B. For soil analyses by the GRO and DRO methods, the Minimum Reporting Level (MRL) as defined in the Methods, is to be equal to or lower than the Maine Bureau of Health's published maximum Exposure Guidelines (MEG), a commissioner approved site specific clean-up standard, or an alternate performance standard approved by the commissioner.

C. For water analyses, other than GRO and DRO; the Estimated Quantitation Limit (EQL), as determined by EPA guidelines, SW-846, is to be equal to or lower than the Maximum Contaminant Level (MCL) or primary drinking water standard, and in the absence of a MCL, is to be less than the Maine Bureau of Health's published Maximum Exposure Guideline (MEG) for that test parameter.

D. For soil analyses by methods other than GRO and DRO; the Estimated Quantitation Limit (EQL), as determined by EPA guidelines SW-846, is to be equal to or less than five (5) parts per million for gasoline analyses and less than 10 parts per million for fuel oil analyses or an alternate performance standard approved by the commissioner. For analytes other than gasoline or fuel oil the EQL is to be less than or equal to one-half the applicable MCL or MEG.E. All laboratory analytical data submitted to the commissioner pursuant to this rule must come from a laboratory certified under the applicable requirements of the Maine Department of Human Services Comprehensive and Limited Environmental Laboratory Rules.

NOTE: Pursuant to GRO and DRO laboratory method descriptions, the presence of a material outside the gasoline or diesel fuel range on a chromatogram should be included on the respective laboratory report.

APPENDIX T: Determination of the Water Supply Potential of a Proposed New Underground Oil Storage Facility Site on a Mapped Significant Sand and Gravel Aquifer

If the site of the proposed facility falls within a zone mapped as generally yielding 10 to 50 gallons per minute (g.p.m.), but possibly more than 50 gallons per minute in some locations, the applicant must implement a limited hydrogeological evaluation to determine whether the site is located on a previously unrecognized high yield zone (well yield greater than 50 g.p.m.) of the aquifer.

The evaluation may be as extensive as the applicant chooses, but at a minimum it must demonstrate to the commissioner's satisfaction whether or not a properly constructed well in the sand and gravel aquifer beneath the site would yield greater than 50 gallons per minute. The design of the evaluation, the fieldwork and the written report must be supervised and certified by a Maine-certified geologist with demonstrated expertise in hydrogeology.

The Sand and Gravel Aquifer Mapping Program at the Maine Geological Survey has used a single-borehole evaluation to estimate the projected long-term yield of aquifers in areas where no other information is available. The techniques are described on pages 15-18 of Maine Geological Survey Open File No. 98-2, Hydrogeology and Water Quality of Significant Sand and Gravel Aquifers in Parts of Piscataquis and Somerset Counties, Maine, 1998, Nichols, W. J., Neil, C. D., Locke, D. B. and Foley, M. E. (authors). The method requires a borehole advanced to the bedrock surface with continuous soils sampling. Geological information along with the grain size analysis of the soils samples will be used to estimate the hydraulic conductivity of the strata, and the aquifer thickness will be used to calculate a transmissivity value and to estimate the long-term yield of a well at that location. An evaluation using this methodology is the minimum that the commissioner would accept. The commissioner would also accept the results of a properly conducted and interpreted pumping test.

NOTE: Copies of the above referenced technical document are available from the Department or the Maine Geological Survey

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Chapter 691-2004

[1] This is the effective date of this amended rule as established by the State of Maine Secretary of State.

[2] Printing and typographical errors of a non-substantive nature were corrected on this printing date.